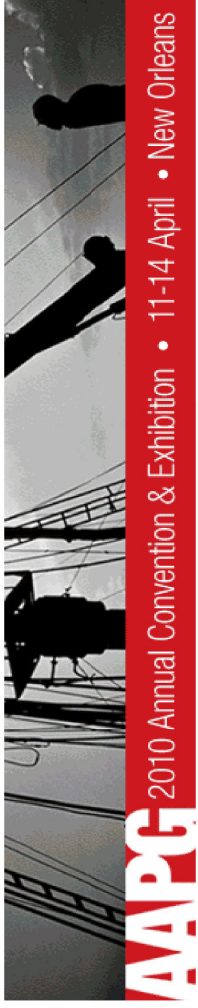




Partnering with
 **knowledge reservoir**



to bring you world class
Business Information Solutions

Adapting Oil and Gas Data Strategies for CO2 Sequestration

Jess B. Kozman, Principal Consultant, CL Tech
Kandy Lukats, President & CEO, 3-GiG



Helping You Organize Your Proprietary Business Information

Challenges for Oil and Gas Data Management

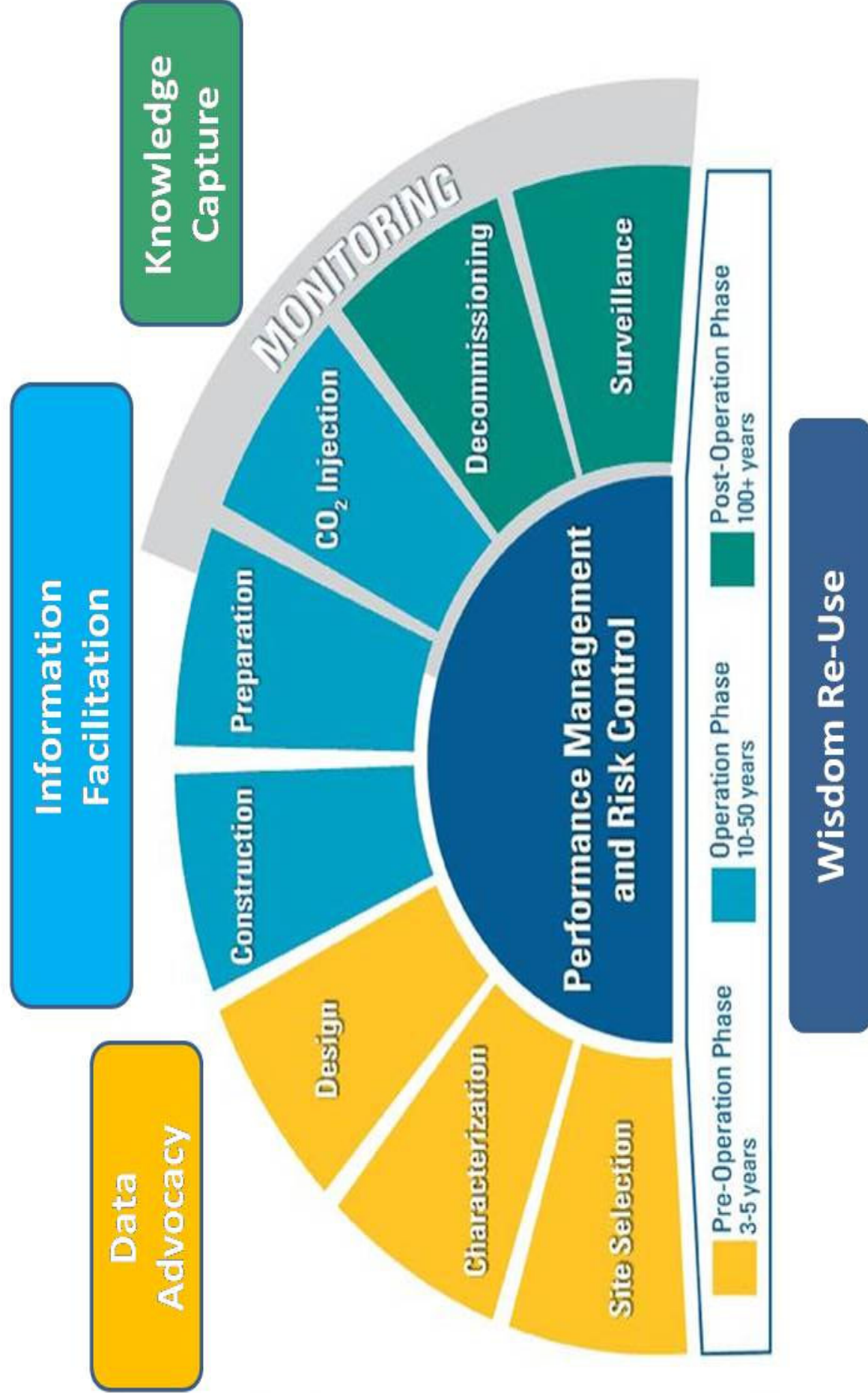
- Too much time expended looking for and managing data**
- “Line of Sight” for management on technical field operations**
- Non-standard processes and information in discipline silos**
- Lack of consistency across organizational units and assets**
- Final results of many studies never captured, knowledge lost**
- No quality methodology for what is good or clean data**
- Data version control for real-time operations**
- No single source of the truth for validated data**
- No way to create a life of asset story over time**
- Same information duplicated in multiple places**
- No way to bring new people up to speed quickly**
- Disconnect between business and technical systems**

Drivers for Managing Data

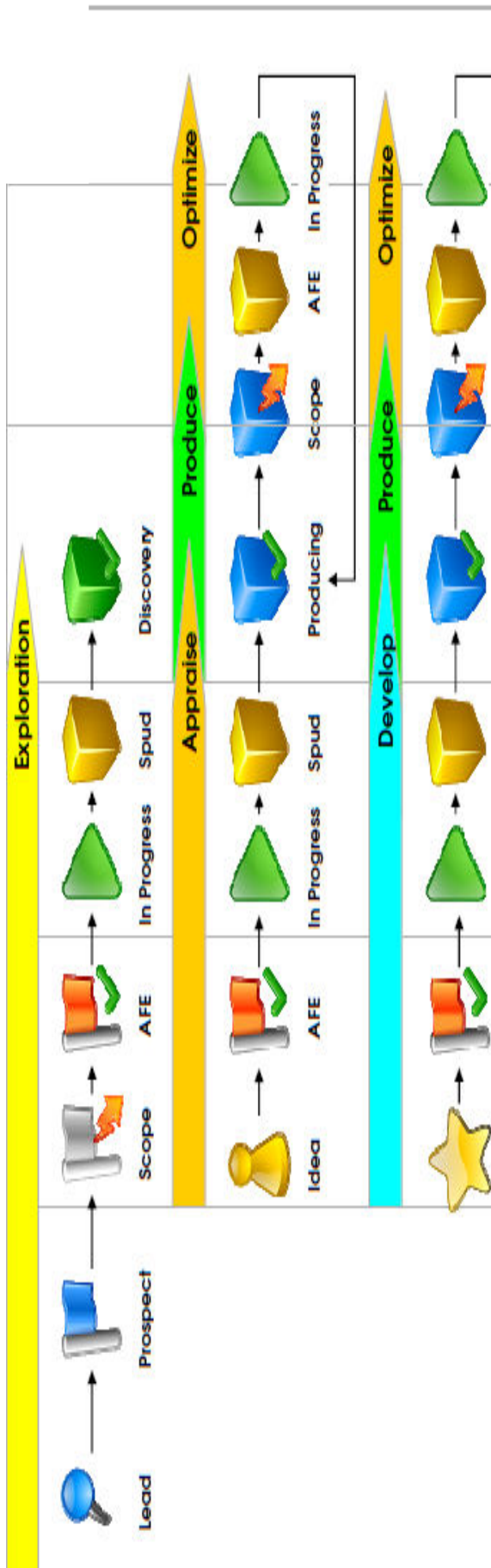
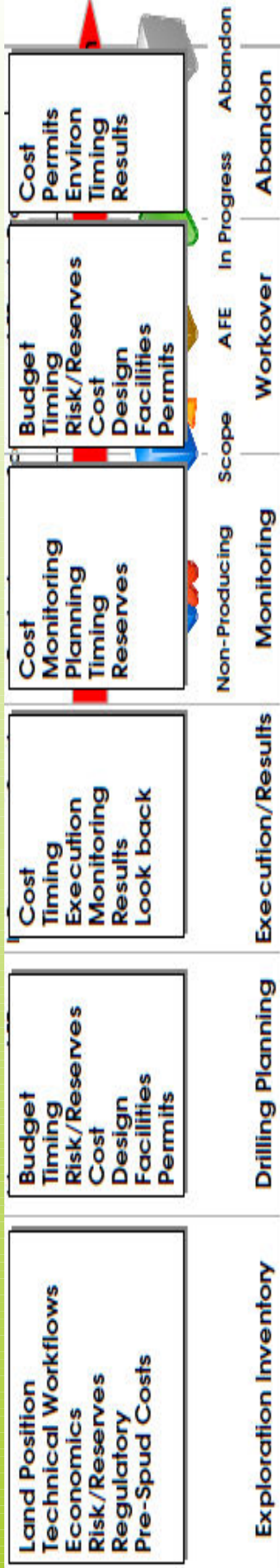
- 1) **Financial – Decision support and risk management for site characterization, injection technology, and storage modeling.**
- 2) **Regulatory – Leverage common data delivery methodologies across multiple reporting agencies and jurisdictions.**
- 3) **Public Opinion – Provide science-based information about operations and their environmental impact**

Doesn't this sound familiar?

Data Management Lifecycle for CO2 Projects



Documented Processes:

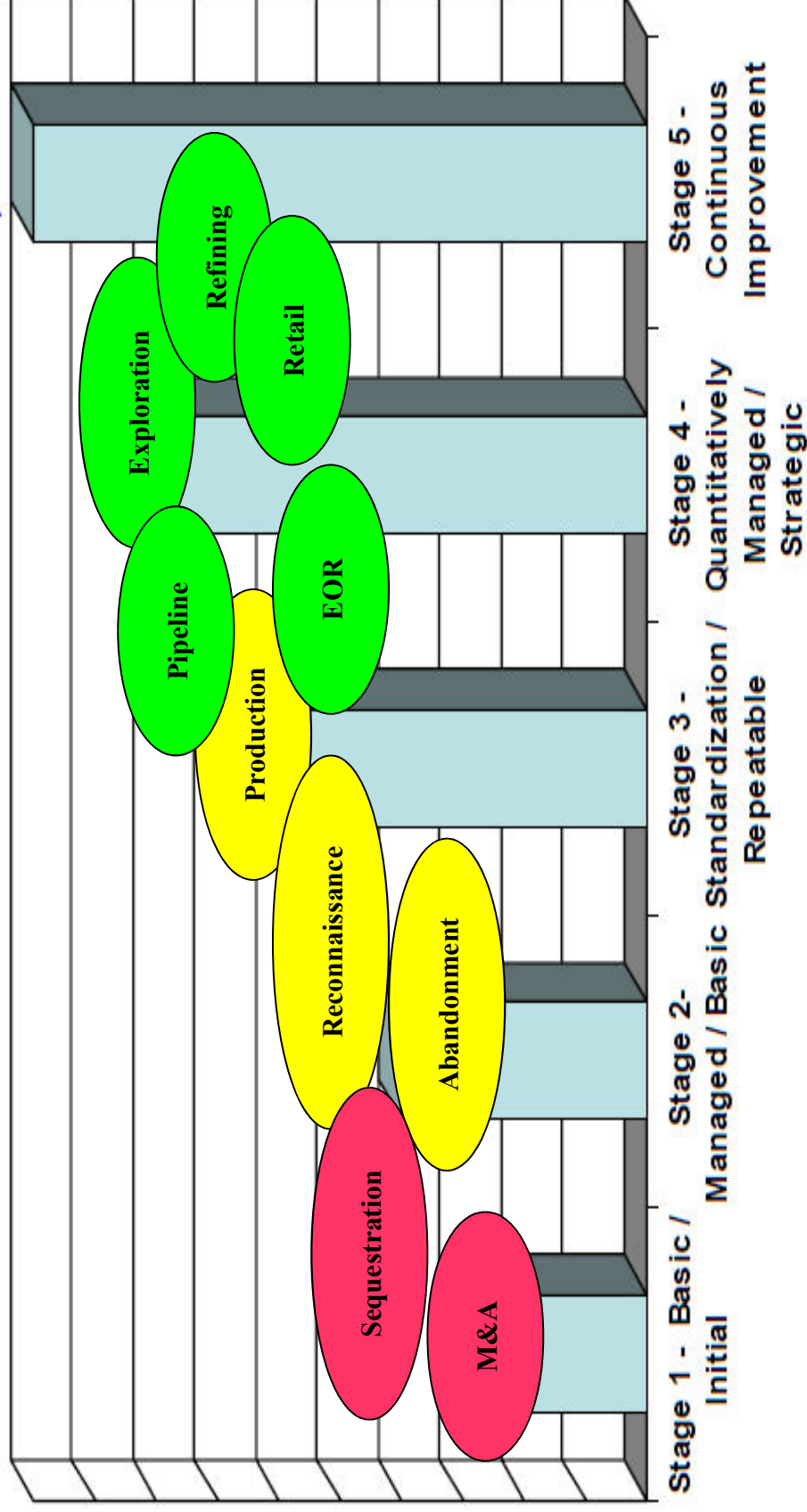
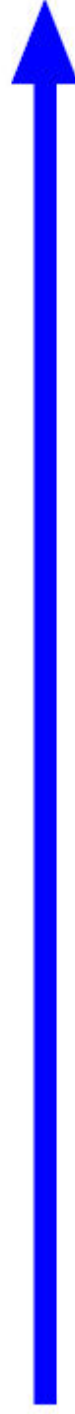


Supporting Technology



Sequestration as a Business Segment:

Five progressive stages of increasing Data Management Capability and maturity



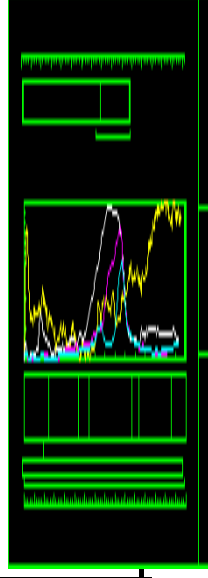
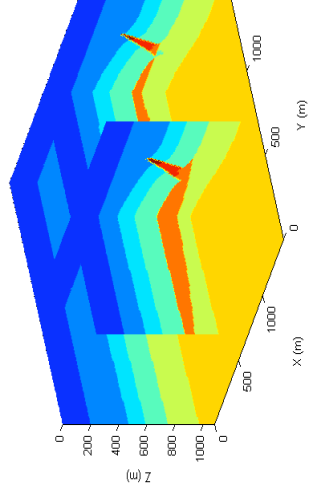
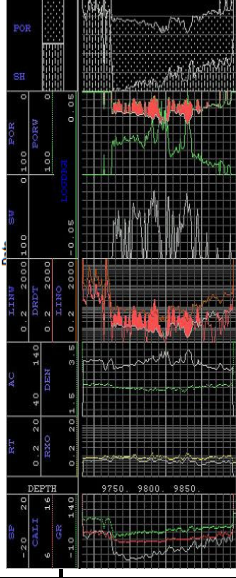
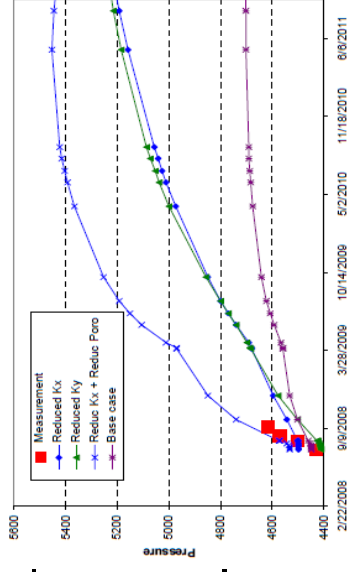
Data Volumes will Drive Adoption of Standards:

CO₂ surface flux using mobile chambers, eddy covariance, and dipole laser technique

Soil gas sampling

Shallow groundwater composition

Introduced (PFTs) and natural (isotopes) tracers



Subsurface pressure and temperature

23 data channels / well
8 GigaBytes / month

Downhole well logging

17,635 high-resolution TIFF files, volume = 553.34 GigaBytes

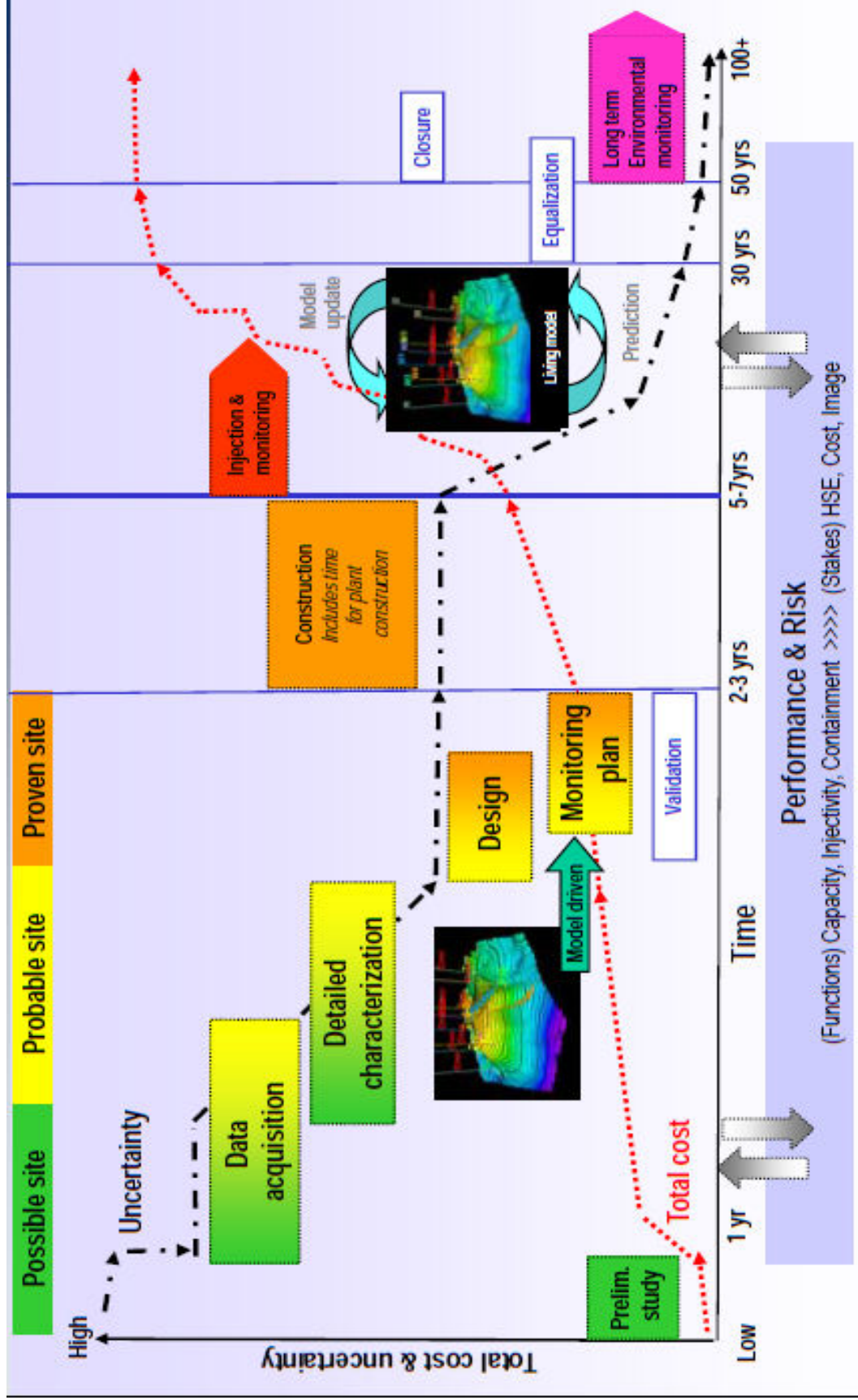
Vertical seismic profiling and cross well seismic imaging

168 GigaBytes / model

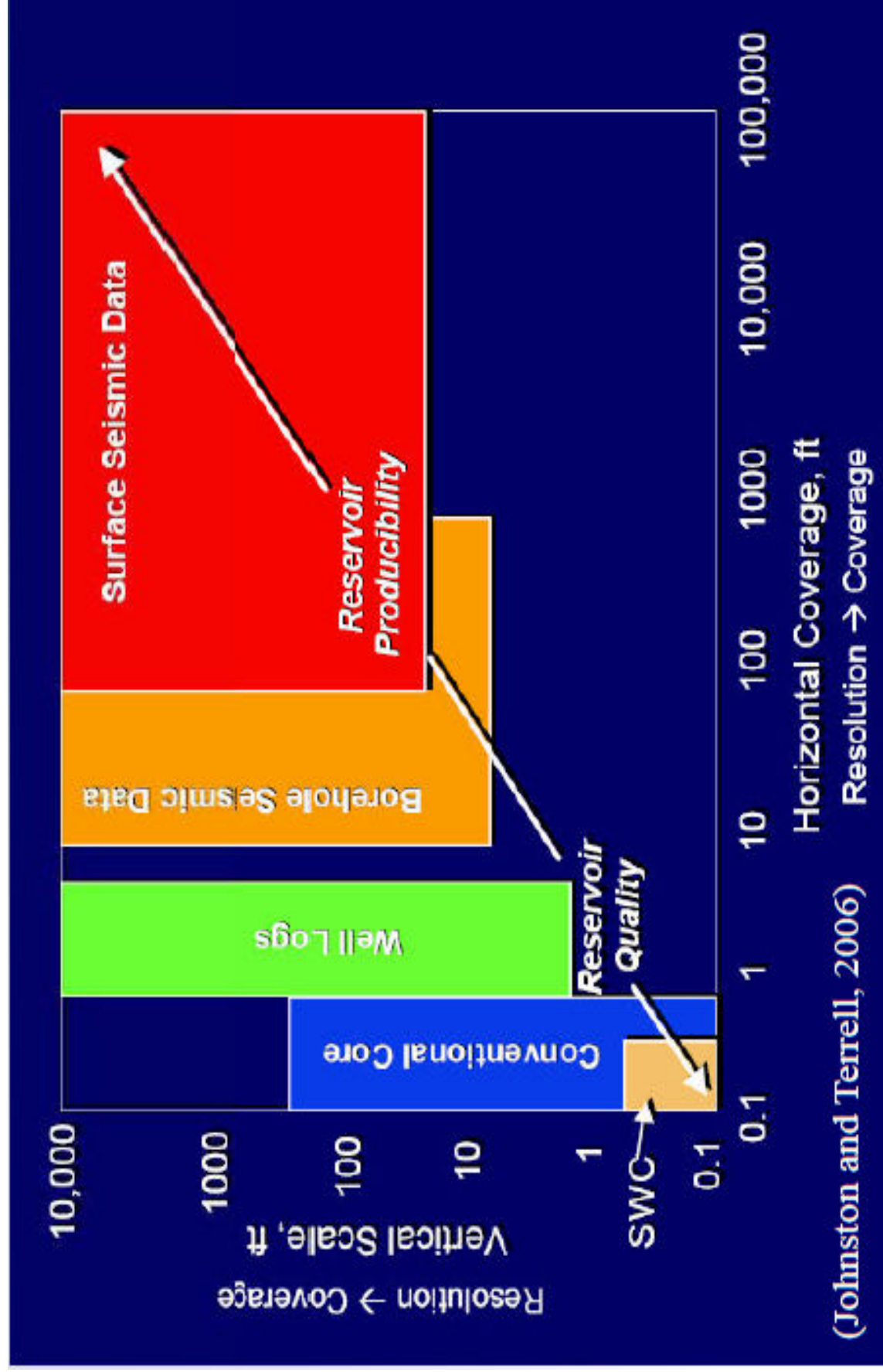
Electrical and electromagnetic techniques

1.2 GigaBytes / 1000 m log

Data at Multiple Time Scales



Data at Multiple Dimensional Scales



(Johnston and Terrell, 2006)

A Case Study: Field Study Delivery

Prospect Director 2.2
Viewing: Blocker Field Study Project

Project	Type	Category	Size
ND Cross plot example neutron normalization B...	.tif	Processing and Editing	1.85 MB
Log_Name_Conventions.xls	.xls	Supplemental Workflow Information	19.44 KB
Composite plot show intra taylor washout alle...	.tif	Processing and Editing	644.25 KB
Computed log plot for buckles quality WARE G...	.tif	Reservoir Quality Analysis	846.61 KB
blocker_baseemap.pdf	.pdf	Base Map	558.64 KB
Histogram regional core porosity.tif	.tif	Reservoir Property Analysis	876.94 KB
Composite log plot showing calculated porosit...	.tif	Reservoir Property Analysis	792.19 KB
PWELL results Facimage per...	.tif	Reservoir Property Analysis	792.19 KB
ND crossplot for core descri...	.tif	Reservoir Property Analysis	1.00 MB
Core porosity compaction co...	.tif	Reservoir Property Analysis	18.29 KB
Composite log showing Mass	.tif	Reservoir Property Analysis	4.80 KB
ND Crossplot good hole poygon Allen lenora G...	.tif	Processing and Editing	448.97 KB
ND Crossplot results good hole poygon Allen L...	.tif	Processing and Editing	678.47 KB
Petrophysics Workflow Methodology.ZIP	.ZIP	Supplemental Workflow Information	13.93 KB
Histogram of core grain density for four wells.tif	.tif	Reservoir Property Analysis	866.94 KB
Density histogram field and Bath a 5 massive a...	.tif	Processing and Editing	1.64 MB
PWELL Crossplot Facimage predicted versustif	Reservoir Property Analysis	166.86 KB
Composite log predicted to core lithofacies and...	.tif	Reservoir Property Analysis	457.20 KB
compositeplots.zip	.zip	Computed/Composite Logs	110.72 MB
Computed LAS files.zip	.zip	Computed/Composite Logs	189.71 MB
Pickett Plot water saturation george A and Btif	Reservoir Property Analysis	1.19 MB

File Information
File Identification: Histogram of core grain density for four wells.tif

Tags
Database: Geology
Data Type: Core
Histogram

Report Supporting File Type
Figure Table Original
Interpretation Software
Screen Capture

Source
Reservoir

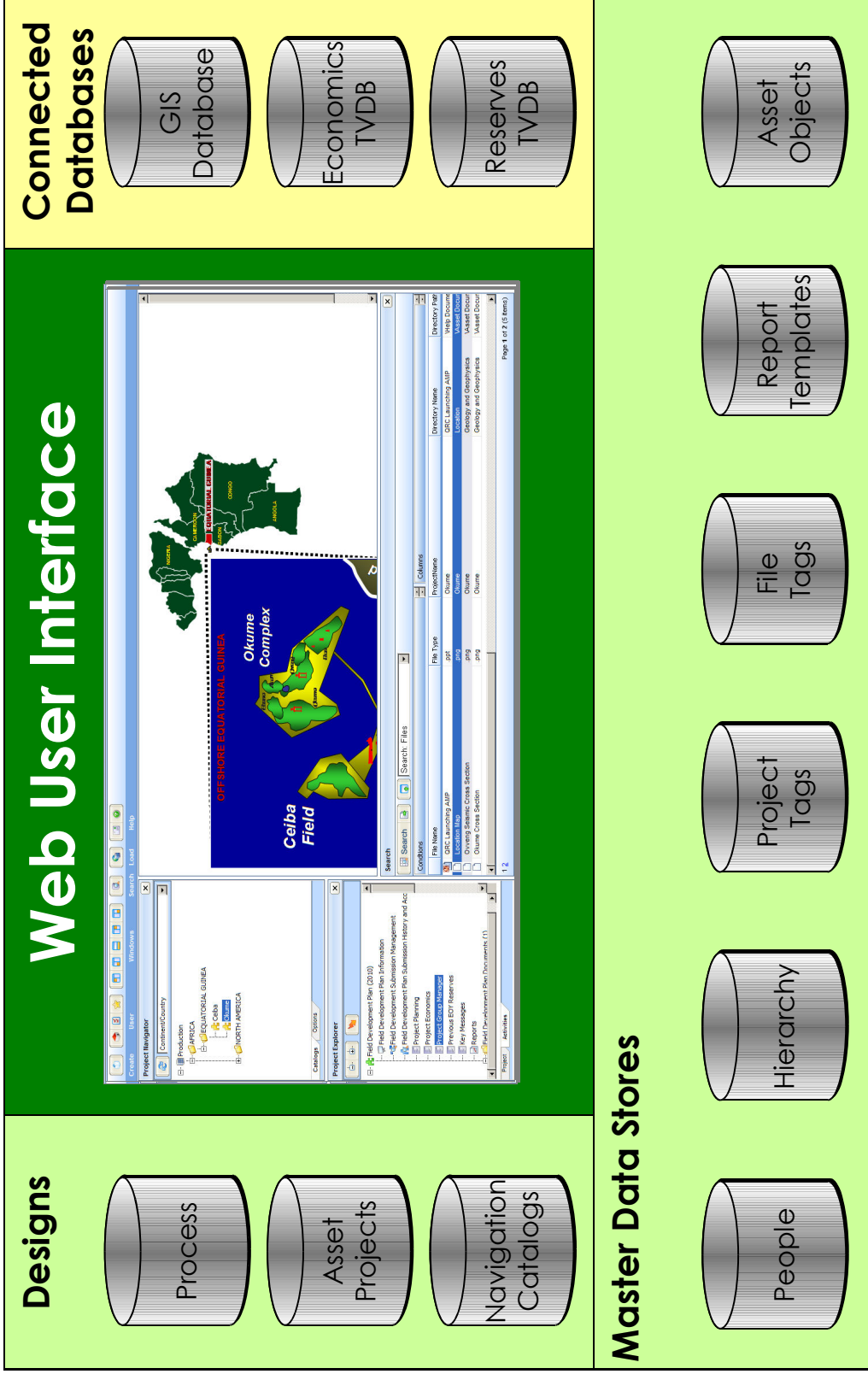
Workflow
Analysis
Database
Interpretation

Description
Figure 85 : Histogram of core grain density for four area wells (Author: Keith Byerley (Petrophysics))
Report Page Number : 102

Project Navigator
Geopolitical
Gregg
1/42183304500000
1/42183304780000
5/42183317700000
9/42183317220000
Harrison
Abney Gas Unit D1/42203302150000
ALLEN_LENORA_GU_1/42203308270000
ALLEN_LENORA_GU_3/42203337490000
ALLEN_LENORA_GU_4/42203337500000

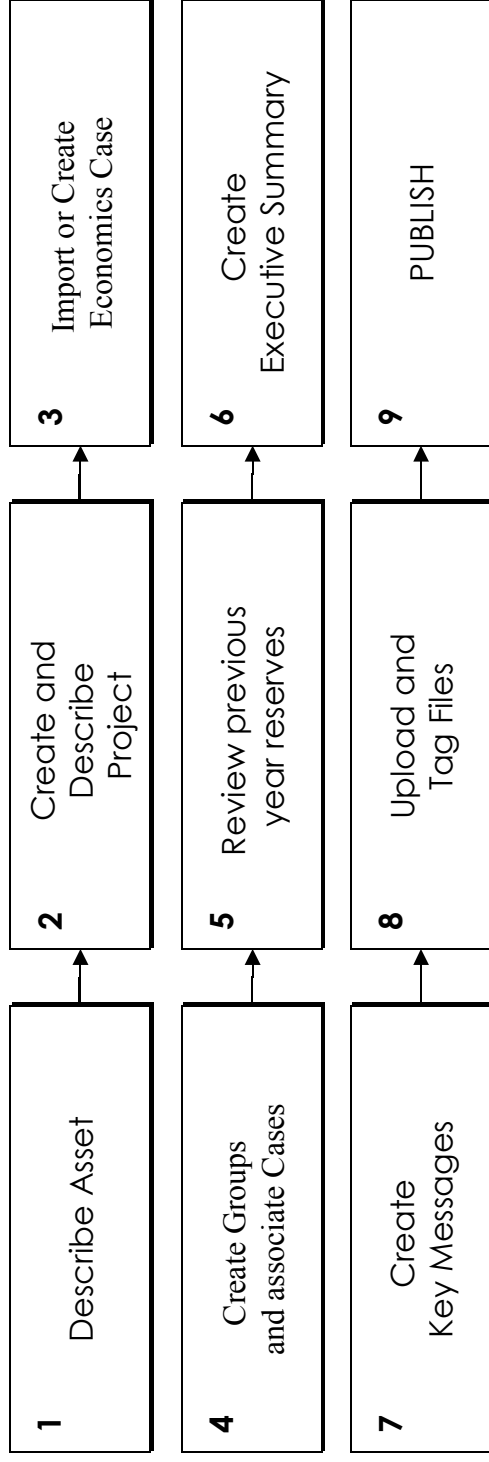
Project Explorer
Team
Final Report (1)
Field Study Report Supporting Files (199)
Regional Geology (78)
Blocker Field Zonation (33)
Petrophysics (29)
Volumetrics (19)
OGIP Maps (16)
Supplemental Workflow Information (1)
RGIP - Total Field (17)

Configurable Solution Features

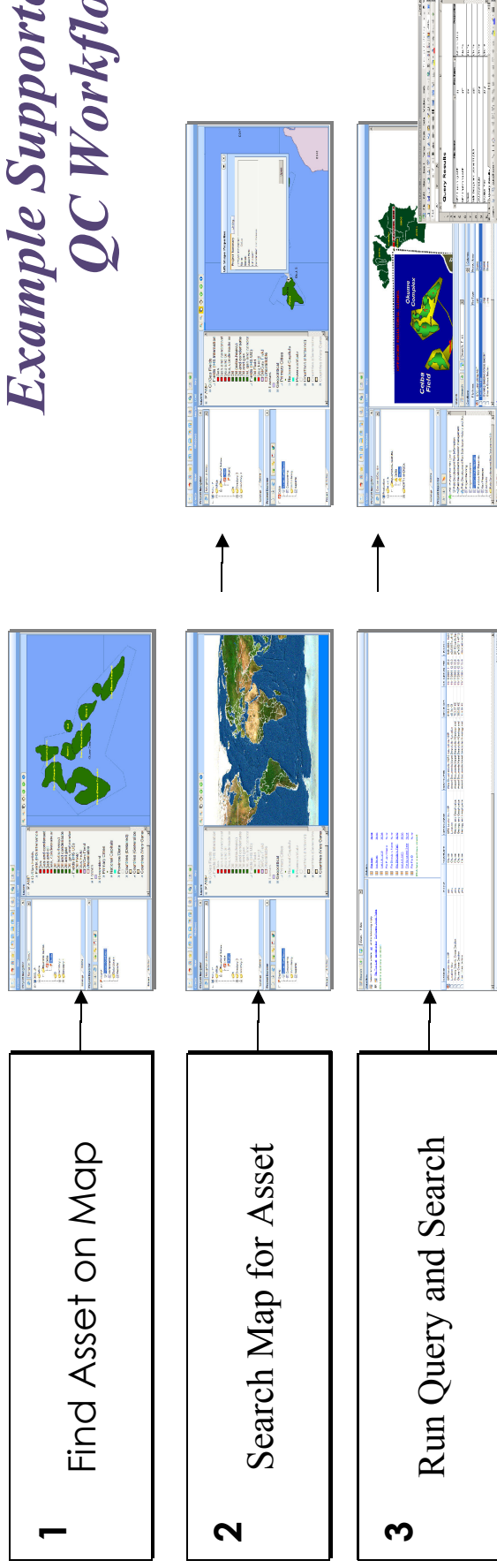


Example Workflow

High Level Asset Team Workflow



Example Supported QC Workflow



Links to Geophysical Data Locations

The screenshot displays a geophysical software interface with the following components:

- Project Navigator:** Lists project files and folders, including:
 - Roberta Young
 - Dynamics
 - Proposed Well Locator
 - CO2 STORE
 - Kentucky Regional Project DEMO ONLY
 - Analog Injector Well Project DEMO ONLY
 - Big Sandy Site Evaluation Project DEMO ONLY
 - Jp Smith #1
 - Proposed Well Location Data
 - Proposed VI
 - Roberta Young
- Project Explorer:** Shows a hierarchical view of the project structure:
 - Big Sandy
 - 1. Project Information and Business Process Managr
 - 2. General Site Information
 - 3. Clients Partners and Location
 - 4. Sequestration Targets
 - 5. Schlumberger CS and External Team
 - 6. Workflow Tracking
 - 7. Project Files (18)
- Main Map:** A map of Kentucky and West Virginia showing county boundaries and geophysical survey locations. Red lines indicate survey paths, and blue lines indicate other survey paths. Locations are numbered 1 through 11. A yellow box in the top right corner of the map area contains contact information:

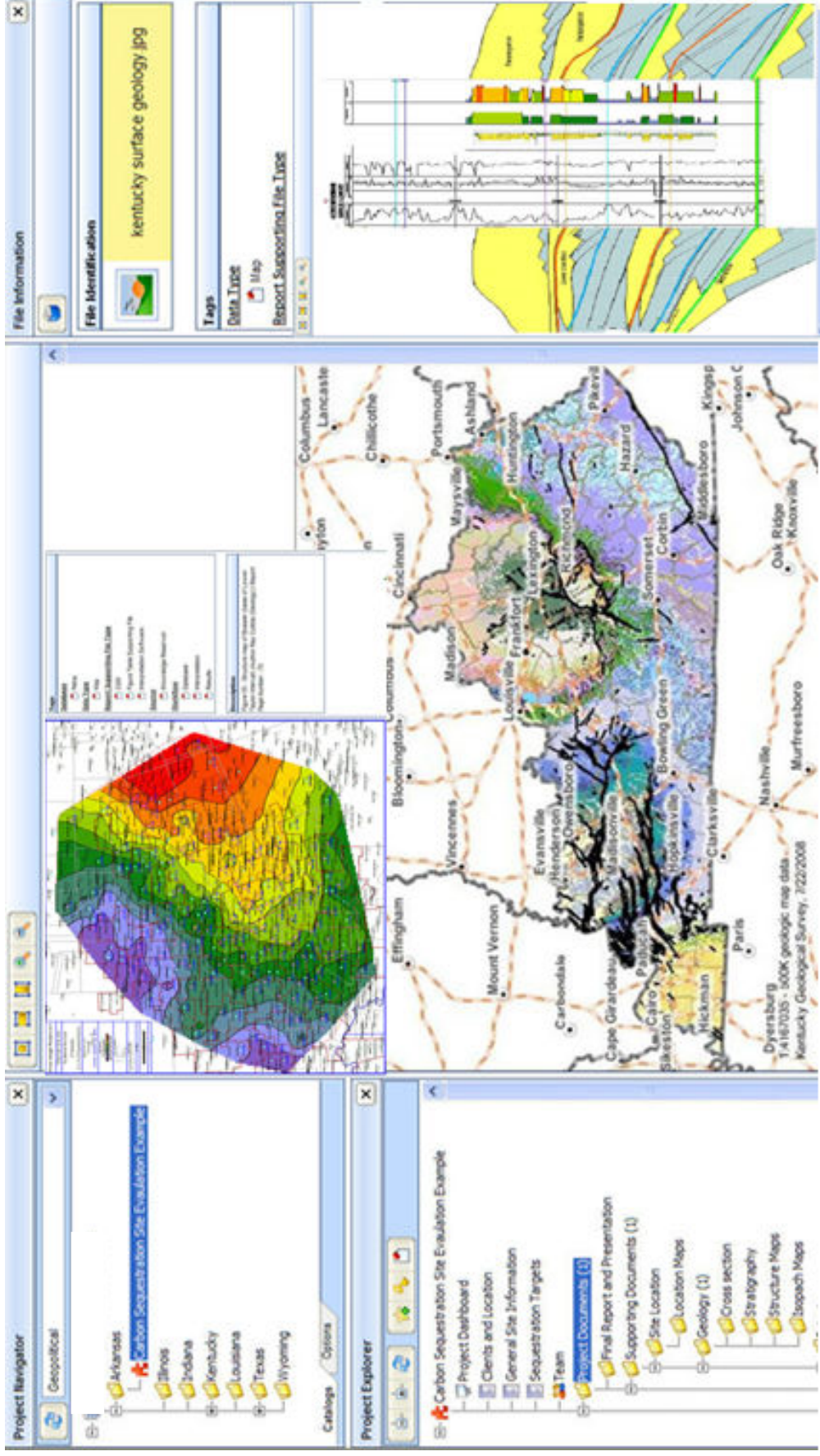
Contact Info
Email: annk...
Phone : 231-...
Fax: 231-27...
- File Information Panel:** Located at the bottom of the interface, it shows details for the file "Seismic Spec Shoot Map.png". It includes fields for File Status (Final), Scale, Source, Partnership, and a Description field.

Case Study: Seismic Data View

The screenshot displays a software application interface for viewing seismic data. The main window shows a grayscale seismic waveform with several distinct peaks and troughs. The interface includes several panes:

- File Information:** Shows the file name "Seismic1.jpg" and a small thumbnail image.
- Tags:** Lists "Source" and "Petrel".
- Description:** A blank text area for additional information.
- Project Navigator:** A tree view showing the project structure, including folders like "Favorites", "Kentucky Regional Project DEMO ONLY", and "Proposed Well".
- Project Explorer:** A tree view showing the project components, including "GIS Data", "Maps (8)", "Meetings, Agendas and Minutes", "Personnel", "Petrel Projects", "Presentations (1)", "QHSE", "Reports (1)", "Seismic (1)", "Simulation", "Strat Columns", "Tops", "Well Data (3)", and "Websites".

The Prize: Automated Decision Support



Why use the PPDM model for CO2 Sequestration?

- **The data model can be complemented by proven process and document management solutions and a role-based user interface**
- **Efficient and configurable access to:**
 - Project data
 - Documents
 - Images
 - Knowledge repositories
 - Narratives
 - Personnel meta-data
 - Corporate process audit trails
 - Taxonomies
- **Repeatable and adaptable model**
- **Execution at a fraction of expense allocated for in-house development**

Industry Synergy



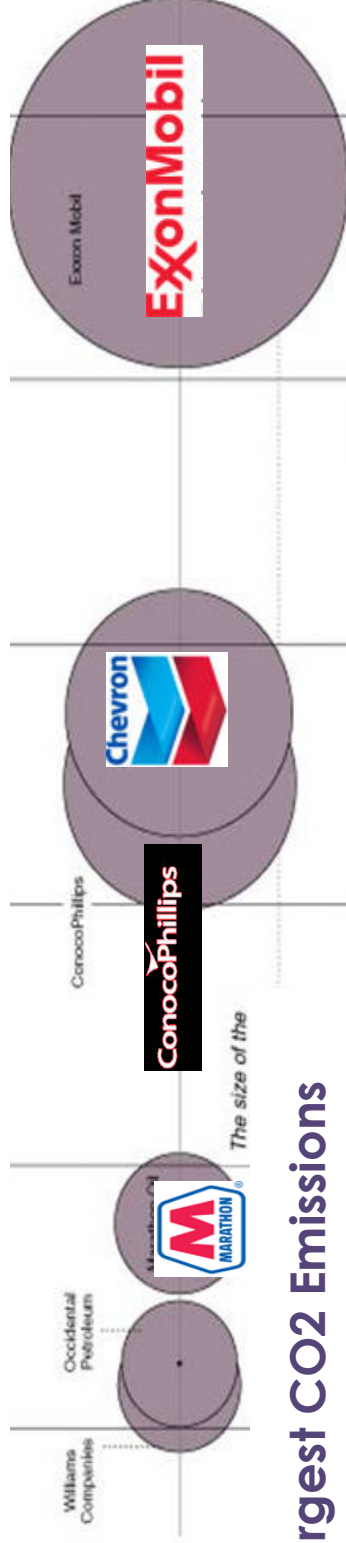
Oil Company Participants in Department of Energy Carbon Capture Project



Some Oil Industry Members of PPDM



Early Adopters of the PPDM Intelligent Information Management Technology



Largest CO2 Emissions